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50 Years of UST Yields - How Well do Forwards Predict?

Posted by Peter Orr on Fri, May 17, 2013 @ 06:30 AM

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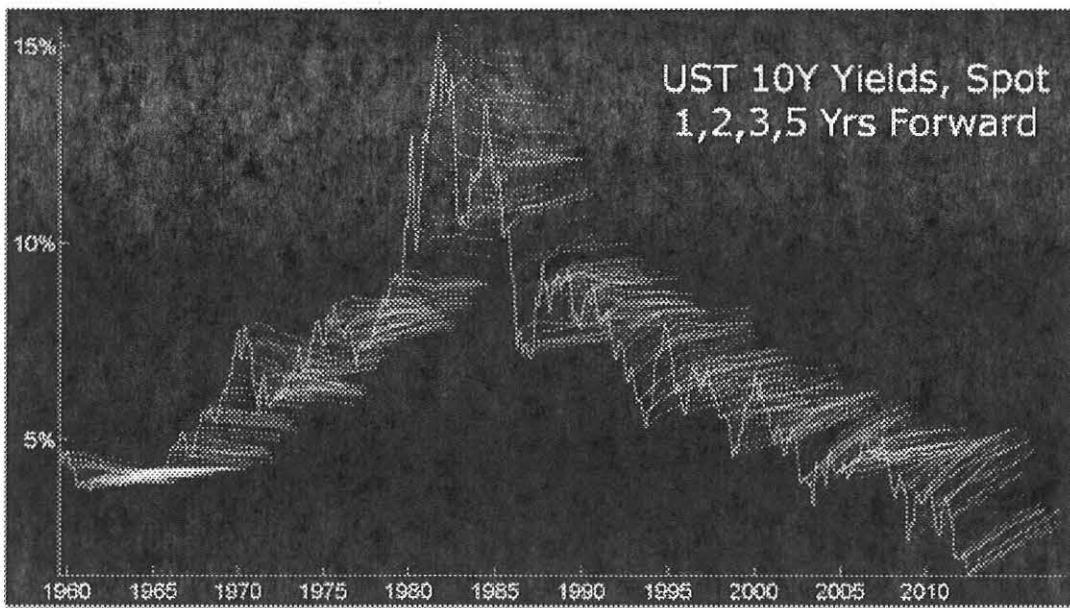
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"Despite its role in...finance, the expectations hypothesis (EH) of the term structure of interest rates has received virtually no empirical support." - [Predictions of Short-Term Rates and the Expectations Hypothesis](#), Federal Reserve Bank of St. Louis

As we've written on these pages before, [forecasting is a necessary evil](#) in finance. It's uncertain by nature and of course the longer the horizon, the more difficult the job. The theory that forward rates are good predictors of future realized rates is called the [expectations hypothesis](#), and as one MIT professor put it, "If the attractiveness of an economic hypothesis is measured by the number of papers which statistically reject it, the expectations theory of the term structure is a knockout."

For fun (and to dust off my fast fading coding skills) I went back and looked at how US Treasury implied forward 10Y rates have done in forecasting realized 10Y UST yields from July, 1959 to the present. We used first of month data for 3, 6 and 12 month Tbills as zero rates (making the appropriate daycount adjustments of course) and then 2, 3, 5, 7, 10, 20, and 30-year UST coupon instruments for our implied 10Y forward calculations. And this is what we get...



The red line is the actual 10Y yield over the period and the "hair" is the implied 10Y par yield 1, 2, 3, and 5 years forward. The way to read this then is to look at how often the hair tracks with the actual realization of the 10Y yields as shown by the red line. In general, during this single big rate cycle we've seen over the last 50 years, forward rates have badly underpredicted when rates were going up (note the implied decreasing 10Y forwards during the 70s) and then overpredicted over the last 30 or so years as rates have fallen. How badly do forwards do? Well over this 50 year span, and this holds over most subperiods as well, you'd be better off as a forecaster just assuming today's yield curve stays constant i.e. a perfectly random walk.

Let's look at the tax-exempt market. Analyzing today's current tax-exempt yield curve (non-call) we see an implied increase in the curve over 10 years, though we think not in a particularly realistic way. The bottom line in the chart below is the current non-call

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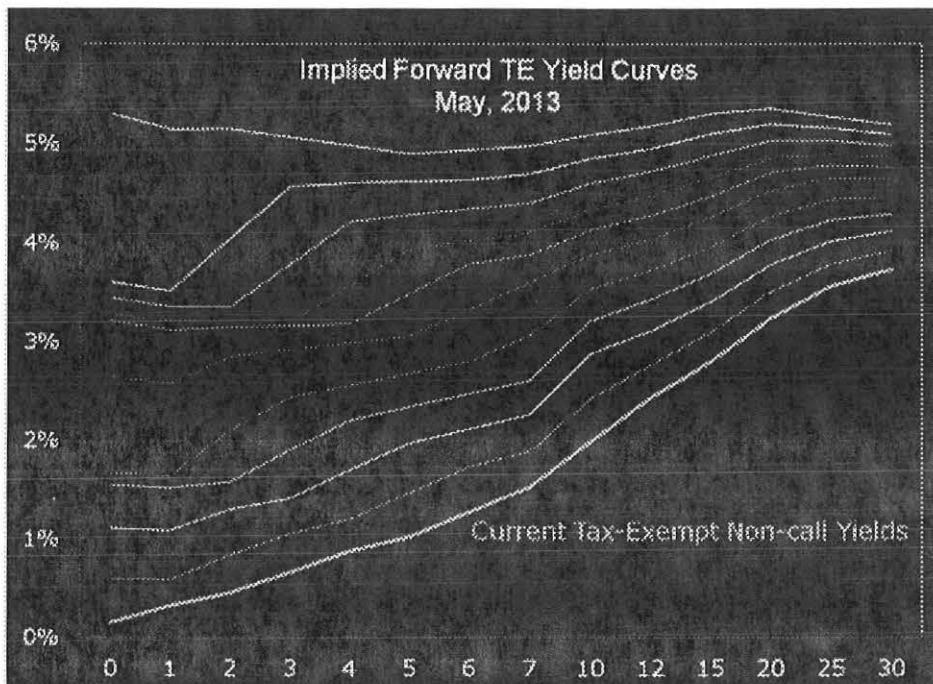
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tax-exempt curve from 1 month out to 30 years (labeled in green).



Each successive curve above it is the implied forward yield curve in 1 year forward increments from 1 year through 10. Over the 10 year horizon, you can see the 1 month tax-exempt rate smartly moving up over 500 basis points, equivalent to a 7% slam on the monetary brakes by the Fed. However this is accompanied by only a 1.45% move in the long end of the curve from 3.73% up to 5.18%. Realistic? Perhaps, but we'd expect to probably see a higher 30Y rate if the Fed were really that active over the next 10 years.

Don't get me wrong - if you're in a financial services environment as a trader or you're looking to perform a fair price analysis of an interest rate derivative using an interest rate model, you *better* use forward rates. If you've got complete and relatively efficient markets, you'll get your head removed if you don't. However, if you're an issuer or working with an issuer looking at some sort of scenario analysis on their debt portfolio, forward rates may be a "good to know" but probably not the end of the forecasting road.

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Comments

Another good post, Peter! Here is a related thought. Given that the implied forward rates are derived from today's yield curve, an issuer that issues (non-callable) fixed rate bonds is "locking in" these implied forward rates. Thus, even though you note that the yield curves "forecasted" by the implied forwards appear to be rather extreme and maybe even implausible, hundreds of issuers are locking them in every week. Most of them buy call options that provide some pretty significant protection against incurring huge opportunity costs if rates end up tracking significantly lower than the implied forwards. However, notwithstanding that risk-reducing call option, by issuing fixed rate debt, debt managers are implicitly "betting" that rates will be even HIGHER than the (implausibly?) high implied forward rates. In other words, it appears that debt managers must be thinking one of two things. The first possibility is that they think there is a greater than 50/50 chance rates will be higher than the implied forwards. The second is that they don't necessarily think rates are likely to be higher than the implied forwards, but in the (unlikely) event that rates do turn out to be higher, the impact will be so adverse to the issuer's financial condition (or debt manager's job security?) that it cannot be risked, even if the likely opportunity cost is significant. Food for thought?

Posted @ Saturday, May 18, 2013 11:30 AM by Shaun Rai

Hi Shaun and thanks for the great comment. Just to clarify, my free view (and you get what you pay for!) is that if anything realized rates are likely to be *higher than those forwards at some point over that 10Y horizon, at least at the long end*. What I think is unlikely is the SHAPE of those forward curves. The final TE curve 10 years forward is actually inverted a bit which has never happened in the TE market. That said I think you're exactly right and very

[Link in Interest Rate Modeling!](#)

- [HELP! Can SOMEONE Calculate Refunding PV Savings?](#)

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much food for thought on the issuer decision to issue fixed. There's a certainty "premium" issuers choose to pay and have paid over time that at least in recent history has been very significant.

Posted @ Saturday, May 18, 2013 11:51 AM by Peter Orr

Forward rates are significant even if they do a poor job of predicting the future because they reflect the floating ratings that you can lock-in via futures, FRAs and swaps. If a debt (or risk) manager believes that an interest rate path above the forward curve is either likely or intolerable, then it's reasonable for them to prefer a fixed rate. In addition, we know that real humans are risk averse and will perceive losses (high rates) at least twice as acutely as gains (low rates). This gives them further incentive to pay fixed, even if the yield curve is extremely steep. Sometimes a holistic balance sheet view that includes interest rate sensitive assets can help justify a reasonable amount of unhedged variable debt, since interest income in a high rate scenario would offset higher variable interest expense. It can be difficult to break these silos down. However, doing this is especially important in the public sector given stressed budgets, a chronically steep muni yield curve and the additional cost associated with having too little variable rate debt. Peter, awesome chart...thank you for pointing out a truly hairy problem. The above is my personal opinion only.

Posted @ Tuesday, May 21, 2013 8:44 PM by Brett Whysele

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